Claims

[c1] What is claimed is:

1. A jet in flow communications with a reservoir comprising:
a substrate having a manifold for receiving fluid from the reservoir;
an orifice layer disposed above the substrate so that a plurality of chambers are formed between the orifice layer and the substrate; and
a plurality of nozzles that are disposed on the orifice layer and correspond to the plurality of chambers for ejecting the fluid in the chambers so as to form a plurality of droplets, each of the nozzles comprising:
an orifice formed on the orifice layer; and
at least three bubble generators electrically connected to a driving circuit and disposed at a first side of the orifice and a second side of the orifice, at least two of the bubble generators disposed at one of either the first side or the second side, and at least one of the bubble generators disposed at the other of the first side and the second side, the driving circuit driving the bubble generator(s) disposed at the first side to generate a first bubble in a corresponding chamber and driving the bubble generator(s) disposed at the second side to generate a second bubble in the corresponding chamber;
wherein the driving circuit drives the bubble generators selectively so that each of the nozzles is capable of ejecting droplets of different sizes.

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[c2] 2. The jet of claim 1 wherein an interval between the manifold and the first side is less than an interval between the manifold and the second side.

[c3] 3. The jet of claim 2 wherein the first bubble is used as a virtual valve for restricting fluid between the first bubble and the second bubble to avoid flowing to the manifold when the second bubble is generated.

[c4] 4. The jet of claim 1 wherein each of the bubble generators is a heater, the driving circuit drives the heater(s) disposed at the first side to heat fluid in the corresponding chamber so as to generate the first bubble, and the driving circuit drives the heater(s) disposed at the second side to heat fluid in the corresponding chamber so as to generate the second bubble.

[c5] 5. The jet of claim 4 wherein an interval between the manifold and the first side

is less than an interval between the manifold and the second side.

[c6] 6. The jet of claim 5 wherein the first bubble is used as a virtual valve for restricting fluid between the first bubble and the second bubble to avoid flowing to the manifold when the second bubble is generated.

[c7] 7. The jet of claim 4 wherein there is at least one heater disposed at the first side and connected in series to one of the heater(s) disposed at the second side, wherein resistance of the heater disposed at the first side is greater than resistance of the heater disposed at the second side.

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[c8] 8. The jet of claim 7 wherein each of the heater(s) disposed at the first side connects in series to one of the heater(s) disposed at the second side.

[c9] 9. The jet of claim 7 wherein at least two heaters are disposed at the first side, and each of the nozzles comprises a leading wire for connecting one of the heater(s) disposed at the second side with the heaters disposed at the first side, and the driving circuit applies a voltage on at least one of the heaters disposed at the first side to generate the first bubble and the second bubble simultaneously.

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[c10] 10. The jet of claim 7 wherein at least two heaters are disposed at the second side, and each of the nozzles comprises a leading wire for connecting one of the heater(s) disposed at the first side with the heaters disposed at the second side, and the driving circuit applies a voltage on at least one of the heaters disposed at the second side to generate the first bubble and the second bubble simultaneously.

[c11] 11. The jet of claim 4 wherein there is at least one heater disposed at the first side connected in parallel to one of the heater(s) disposed at the second side, wherein a resistance of the heater disposed at the first side is less than a resistance of the heater disposed at the second side.

[c12] 12. The jet of claim 4 wherein the orifice layer comprises at least two structure layers arranged in parallel, and there is at least one heater disposed on each of the structure layers.

[c13] 13. The jet of claim 12 wherein the droplets are ejected from the orifice along an ejection direction, and at least two of the heaters are disposed on the two structure layers linearly along the ejection direction.

[c14] 14. The jet of claim 1 wherein the droplets are ejected from the orifice along an ejection direction, and the bubble generators are disposed in parallel at the first side and the second side.

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[c15] 15. The jet of claim 1 wherein the bubble generator(s) disposed at the first side are arranged along a first straight line, the bubble generator(s) disposed at the second side are arranged along a second straight line, and the first straight line is parallel to the second straight line.

[c16] 16. A jet in flow communication with a reservoir comprising:
an orifice disposed above the reservoir;
a first bubble generator group disposed at a first side of the orifice for generating a first bubble in the reservoir, the first bubble is used as a virtual valve to restrict fluid to avoid flowing to the manifold;
a second bubble generator group disposed at a second side of the orifice for generating a second bubble in the reservoir, the second bubble squeezingfluid between the first bubble and the second bubble out of the orifice to form a droplet;
wherein the first bubble generator group or the second bubble generator group comprises at least two independently drivable bubble generators for generating the first bubble or the second bubble.

[c17] 17. The jet of claim 16 wherein each of the bubble generators is a heater.

[c18] 18. The jet of claim 16 wherein an interval between the orifice and one of the two bubble generators is different from an interval between the orifice and the other one of the two bubble generators.